



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

H.A

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/710,843

08/06/2004

Hung-Cheng Lin

13063-US-PA

4842

31561 7590 04/04/2007
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

LEE, JAE

ART UNIT

PAPER NUMBER

2823

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

04/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/710,843	Applicant(s) LIN ET AL.	
	Examiner Jae Lee	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-17 is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. **Claim 3** is objected to because of the following informalities:

- a. **Claim 3, line 2** : replace "method" with "methane".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. **Claims 1,2,4,6** are rejected under 35 U.S.C. 102(e) as being anticipated by Hoss et al. (Pub No. US 2004/0248334 A1, hereinafter Hoss et al.).

FIG 1B

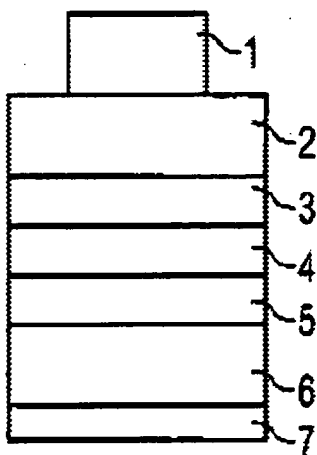


FIG 1C

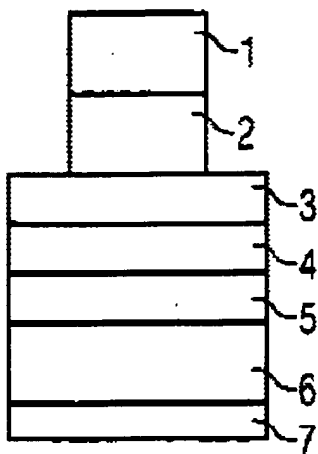


FIG 1D

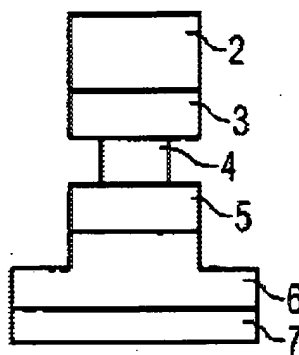


FIG 1E

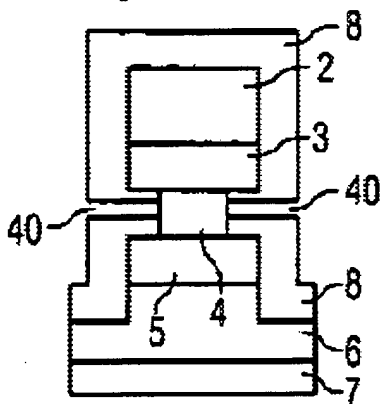


FIG 1F

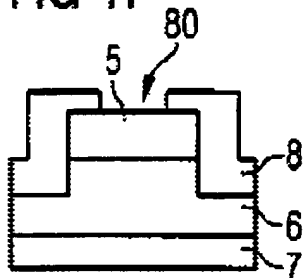
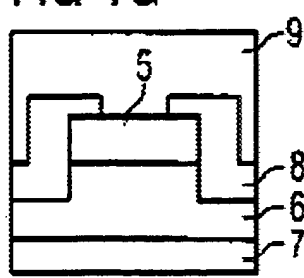


FIG 1G



With regards to **claim 1**, Hoss et al. teaches a method of fabricating a semiconductor laser device, comprising the steps of:

providing an epitaxial structure (see Fig. 1B, epitaxial structure **5,6,7**);

forming a first mask layer over the epitaxial structure to define a protrudent area of a ridge structure (see Figs. 1B-1G, Au sacrificial layer **4**);

forming a conformal second mask layer over the epitaxial structure to cover the first mask layer (see Figs 1B-1G, masking layer **2**);

forming a third mask layer over the second mask layer to expose a portion of the second mask layer above the first mask layer (see Figs 1B, masking layer **1** exposing masking layer **2**);

removing the exposed second mask layer (see Figs. 1C, exposed masking layer **2** removed);

removing a portion of the epitaxial structure using the first mask layer and the third mask layer as an etching mask to form the ridge structure (see Fig. 1D, epitaxial structure **5,6,7** removed using Au sacrificial layer **4** and masking layer **2**);

removing the third mask layer and the remaining second mask layer (see Fig. 1E-1F, Au sacrificial layer **4** and masking layer **2** removed);

forming an insulating layer over the epitaxial structure (see Fig. 1F, insulating layer **8**);

removing the first mask layer to expose the top surface of the protrudent area (see Fig. 1E-1F, Au sacrificial layer **4** removed); and

forming a conductive layer over the ridge structure, wherein the conductive layer contacts with the top surface of the protrudent area (see Fig. 1G, conductive layer **9**).

With regards to **claim 2**, Hoss et al. teaches the method of **claim 1**, wherein the step of removing a portion of the epitaxial structure comprises performing a reactive ion etching operation (see ¶37, lines 5-7).

With regards to **claim 4**, Hoss et al. teaches the method of **claim 1**, wherein the material constituting the insulating layer comprises silicon oxide (see ¶46, lines 5-6).

With regards to **claim 6**, Hoss et al. teaches the method of **claim 1**, wherein the material constituting the first mask layer, the second mask layer and the third mask layer is selected from a group consisting of silicon nitride, silicon oxide, metal, single photoresist layer, multi-layered structure and various combinations of the above (see ¶18, lines 1-4).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoss et al. as applied to **claim 1** above, and further in view of Hata et al. (Pub No. US 2004/0245540 A1, hereinafter Hata et al.).

With regards to **claim 3**, Hoss et al. teaches the limitations of **claim 1** for the reasons above.

Hoss et al., however, does not teach the method of **claim 2**, wherein the gaseous etchant used in the reactive ion etching operation comprise argon, methane, chlorine, and helium (Ar/CH₄/Cl₂/He).

In the same field of endeavor, Hata et al. teaches using an reactive ion etching (RIE) method including chlorine (see ¶193, lines 6-7).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made that utilizing RIE which includes chlorine is a conventional and well-known process in industry as taught by Hata et al.

6. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoss et al. as applied to **claim 1** above in view of Ohtsuka et al. (Pub No. US 2006/0175621 A1, hereinafter Ohtsuka et al.).

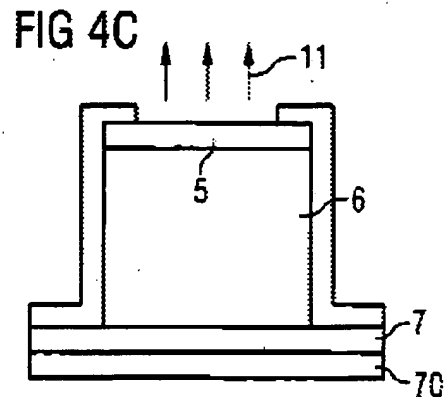
With regards to **claim 5**, Hoss et al. teaches the limitations of **claim 1** for the reasons above.

Hoss et al., however, does not teach the method of **claim 1**, wherein the step of removing the first mask later comprises etching the epitaxial structure with a boiling mixture of nitric acid and hydrochloric acid solution.

In the same field of endeavor, Hoss et al. teaches the use of wet etching procedures to etching masking layers (see ¶25, lines 12-14). Ohtsuka et al. further discloses the use of a boiling mixture of nitric acid and hydrochloric acid as a wet etchant (see ¶51, lines 6-8).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made that a wet etching step is a broad process that also includes utilizing a boiling mixture of nitric acid and hydrochloric acid solution as it is well known in the art as taught by Ohtsuka et al.

7. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoss et al. as applied to **claim 1** above, and further in view of Ueda et al. (Pub No. US 2005/0218414 A1, hereinafter Ueda et al.).



With regards to **claim 7**, Hoss et al. teaches the limitations of **claim 1** for the reasons above. Hoss et al. teaches a Pt P-type contact metal layer (see Fig. 4C, Pt- P-type contact metal layer 5; ¶36, line 3)

Hoss et al., however, does not teach the method of **claim 1**, wherein the material constituting the conductive layer comprises P-type nickel/gold.

In the same field of endeavor, Ueda et al. teaches a semiconductor laser device which includes utilizing a p-type Ni/Au ohmic contact layer which is conventional and well-known to one of ordinary skill in the art (see ¶68, lines 3-4).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made that a P-type contact metal layer can be a broad definition that can also include any ordinary p-type metal layer such as p-type Ni/Au ohmic contact layer as taught by Ueda et al.

Allowable Subject Matter

8. **Claims 8-17** allowed.

9. The following is a statement of reasons for the indication of allowable subject matter:

a. The closest related prior art is Hoss et al. and Ueda et al. Hoss et al. teaches forming a first mask layer over the P-type electrode area, but does not teach forming the said first mask layer to define an N-type ohmic contact metal area within the N-type electrode area. In addition, Hoss et al. teaches removing the first mask layer to expose the P-type electrode area, but does not teach removing the first mask layer to exposing the N-type ohmic contact metal area.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- a. Pakulski et al. (USP#, 6,551,936 B2)
- b. Yoneda (Pub No. US 2005/0190416 A1)
- c. Takei et al. (USP# 6,537,841 B2)
- d. Hata et al. (Pub No. US 2007/0012929 A1)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jae Lee whose telephone number is 571-270-1224.

The examiner can normally be reached on Monday - Friday, 7:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JML



MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800